PRINCIPLES OF MULTIDIALECTAL ORTHOGRAPHY DESIGN

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0. INTRODUCTION

1. THE ADVANTAGES OF A MULTIDIALECTAL ORTHOGRAPHY
   - 1.1 The advantage of one orthography over many
   - 1.2 The advantage of a multidialectal orthography over a unidialectal one

2. PRINCIPLES OF MULTIDIALECTAL ORTHOGRAPHY DESIGN
   - 2.1 Principle 1 - social acceptability
   - 2.2 Principle 2 - psycholinguistic acceptability
   - 2.3 Principle 3 - minimal potential ambiguity
   - 2.4 Principle 4 - simplicity
   - 2.5 Principle 5 - convergence of skewed systems
   - 2.6 Principle 6 - phonemic contrast and neutralization between dialects
   - 2.7 Principle 7 - overall least effort

3. A QUANTITATIVE METHOD FOR COMPUTING OVERALL EFFORT

0. INTRODUCTION

Language variation limits communication. In spoken communication, dialect variation may be so great as to prevent speakers of two dialects of the same language from understanding one another. However, many of these limits to communication can be overcome in written communication. For instance, differing pronunciations of the same word are unified by writing them identically in the orthography. Each reader assigns his own pronunciation to the written symbol.

This paper presents seven principles to follow in designing an orthography which minimizes dialect differences--a multidialectal orthography. A multidialectal orthography is one in which the phonologies of many dialects of a language are compared and accounted for in designing the orthography. The social situation pertaining to the dialects is also considered. We add the further requirement that each possible solution to an orthography problem be examined with respect to each of the dialects to determine the solution that will involve the least effort in learning to use the orthography for the language

group as a whole. The discussion of these seven principles is preceeded by an examination of some advantages of a multidialectal orthography.

1. THE ADVANTAGES OF A MULTIDIALECTAL ORTHOGRAPHY

A multidialectal orthography is always designed to be used by many dialects. The advantages of a multidialectal orthography are discussed in two stages. First, the advantage of having one orthography for many dialects, rather than having many orthographies, is discussed. When one orthography is used for many dialects it need not be a multidialectal one. It could be a unidialectal one--an orthography based on the phonology of one dialect--which has a wide area of use. Thus the second stage of the discussion deals with the advantage of a multidialectal orthography over a unidialectal one in reaching many dialects.

1.1 The advantage of one orthography over many

The tremendous value of having one orthography which covers many dialects is illustrated by the English orthography. Although English spelling has been heavily criticized for not being "phonemic", it has scored a great triumph in uniting the different dialects of a very large and diverse speech community. Many of these dialects are in fact mutually unintelligible. To expand on this virtue of the English orthography, I give the following lengthy quotation from an essay by John Nist, "In defense of English spelling" (1966).

> English spelling minimizes dialect and regional differences within the English language on a world-wide scale. When William Caxton made printing one of the supreme cultural forces in England in 1476, he elevated the Spoken British Standard of London to that of the Written British Standard. Thus the visual morpheme became a power in reducing differences of pronunciation to a single written version. From that reduction, of course, today the three major forms of Modern English--British, American, and Commonwealth--are very nearly identical on the printed page: a great source of the linguistic unity and cultural solidarity of Anglo-Saxon Civilization. If English spelling suddenly became phonemic, however, it would tend to fragment and divide that civilization. If all speakers of the language wrote exactly as they talked, soon would emerge a far more dangerous confusion: that of the inability to communicate with ease. What difficulty the Texan would have in reading the letters from his New York cousin; how hard it would be for the Lancashire farmer to decipher the reports of an Australian soil physicist; with what intellectual sweat a South African novelist would study the lines of an Irish poet!

Here we see the value of one common orthography in providing linguistic unity and cultural solidarity for peoples of divergent dialects. The political value of such an orthography can be seen in the history of many nations (Germany, for example) where a standard "national language" was used to unify a multitude of diverse speech communities. There is an obvious economic value as well. It is cheaper to have one orthography and one literature to serve many dialects than it is to have separate orthographies and literatures for each dialect.

When dialect variation is so great as to make one orthography for many groups impractical, dialect comparisons should still be made in order to make the orthographies as compatible as possible. This makes it easier for the reader who has developed reading skill in the orthography of one dialect to transfer his skill to that of another (Bromley 1961:81). Young (1962) advocates that languages of the same language family should be phonologically compared in order to standardize orthographies. Again, this would make for maximal ease in the transfer of reading skill (or even teaching skill) to a second language.

1.2 The advantage of a multidialectal orthography over a unidialectal one

Sarah Gudschinsky (1973:137) states that when designing an orthography, it is not wise to mix dialects, since the results will probably please no one. Thus she sees the disadvantage of a multidialectal orthography as being that it is artificial. Since it is not the way anybody speaks, it will please no one. She favours a unidialectal orthography modelled after the one most acceptable dialect in the language.

The approach I am suggesting is not one of dialect mixture, but one of dialect comparison to discover levels of phonological structure at which skewed phonemic systems converge (principle 5). By lifting an insistence on "phonemic" orthographies, we may be able to discover a solution at a phonetic, morphophonemic, or fast speech level which finds agreement between all dialects, whereas the phonemic solution would find disagreement. When such a solution is possible, the result is an orthography which is both multidialectal and the way everybody speaks.

It was Myron Bromley (1961:76) who first suggested such a type of multidialectal orthography. He saw that even though the phonemic systems of the Dani dialects (Irian Jaya) were skewed, if sound correspondences at the phonetic level were symbolized a great deal of convergence was achieved. Bromley's objective was "to develop local orthographies which make cross-dialect comparison and reading maximally easy".

Here I expand Bromley's original idea to include searching for phonological convergence at the morphophonemic and fast speech levels, as well as the phonetic. His original objective of ease in cross-dialectal comparison and reading is developed into one of overall least effort for the learners of the orthography (see principle 7). The orthography arrived at by following the seven principles should be the one which requires the least effort to learn to use, when effort is averaged for members of all the dialect groups involved. Least effort implies shortest time needed to learn and highest percentage of persons who succeed in learning. It is at this point that a multidialectal orthography has advantage over a unidialectal one; the overall effort of the best multidialectal orthography will generally be less than (at worst, equal to) the overall effort of the best unidialectal orthography.

2. PRINCIPLES OF MULTIDIALECTAL ORTHOGRAPHY DESIGN

By following the seven principles outlined in this section, one should be able to design a least-effort multidialectal orthography for a group of dialects. The principles are not limited in their applicability to multidialectal orthographies only. Principles 1 through 4 and principle 7 can be followed in designing an orthography for only one dialect. All of the principles can be applied to the problem of creating a unidialectal orthography for use by many dialects. In this case, the least effort criterion would indicate the best dialect out of the many on which to base the orthography.

The statement of these principles is preliminary at best. No doubt there are important considerations which ahve been omitted, and unimportant ones which have been discussed. Further investigation and field testing should suggest refinements in the method proposed here.

2.1 Principle 1 - social acceptability

When given a number of alternative solutions to an orthography problem, the solution which is the most socially acceptable is to be preferred.

At the one extreme, a totally unacceptable solution cannot be tolerated. If the solution to a single orthography problem is totally unacceptable it may lead to the rejection of the whole orthography. At the other extreme, that of total acceptability, there is no problem. A solution that is totally acceptable will meet with no opposition and the orthography will be readily used. In between, the answers are not so obvious. There may be many degrees of social acceptability. For instance, a solution may not be acceptable to the minority who are literate in the national language, though it is perfectly acceptable to the majority who are not. Here the linguist must determine if it is more important to follow the wishes of the influential minority. Many linguists have found this necessary (see for example Phillips 1973).

When considering social acceptability within a group of dialects, the problem can become even more complex. A solution could be acceptable in some dialects while unacceptable in others. Here one must rank the overall acceptability of different solutions by considering the size, location, and prestige of the dialect groups.

In any case, the solution which is the most socially acceptable is to be preferred. In a very real sense, social acceptability is the overriding principle of all the seven; where there is no acceptability, the solution cannot be tolerated, regardless of its linguistic or pedagogical desirability. However, a solution which is partially acceptable, but not the most acceptable, can be tolerated if the other principles suggest that it is the best solution.

2.2 Principle 2 - psycholinguistic acceptability

When given a number of alternative solutions to an orthography problem, the solution which is the most psycholinguistically acceptable is to be preferred.

The practice of psycholinguistic testing of orthographies is a common one. In essence, psycholinguistic testing attempts to determine which solution is the most "psychologically real" to the speakers and prospective readers of the language. When the linguist is not able to decide the proper solution to a phonemic analysis problem or wonders about the best way to symbolize something in the orthography, it is very helpful to present the alternative solutions to the native speakers to determine which one they feel is "right".

The phonemic level is not the only psychologically real level of phonological structuring. The phonetic level is also psychologically real. This is evidenced by the fact that native speakers of a dialect react to the "funny" accents of outsiders. They may not be able to define precisely what is different, but they nevertheless react to it as a real difference. In some cases, the phonetic level may be the most psychologically real level in the minds of the speakers. This is in evidence when speakers of a language (generally ones that are literate in other languages) insist that allophones of a single phoneme in their language be represented by separate orthographic symbols (see for example Phillips 1973). The phonetic difference of the phones is more real to them than the phonemic sameness.

The morphophonemic level may be the most psychologically real level in certain cases. This is true with the plural morpheme in English. Following voiceless stops the morpheme is realized as the phoneme /s/, for example, /kits/ 'kits'. Following voiced stops the morpheme is realized as the phoneme /z/, for example, /kidz/ 'kids'. In other positions, /s/ and /z/ are contrastive phonemes. Here they are morphophonemically conditioned variants. Few speakers of English realize that the sounds at the end of *kits* and *kids* are different.

The sameness of the morpheme is more real than the differentness of the phonemes.

The fast speech level is also a psychologically real level. Though our literary tradition does not allow it, one often sees such spellings as "Wanna go?" for "Want to go?", and "I've gotcha!" for "I have got you!". In these cases, the fast speech level is more real to the writer than the normal speech phonemic level.

The general principle of psycholinguistic acceptability does not presuppose a "phonemic" orthography. The principle of psycholinguistic acceptability requires that the most psychologically real solution be selected.

2.3 Principle 3 - minimal potential ambiguity

When given a number of alternative solutions to an orthography problem, the solution which makes the greatest contribution toward the resolution of potential ambiguity is to be preferred.

Ideally, an orthography should minimize the potential ambiguity of words in context. One drawback of choosing not to distinguish phonemes with low functional load is that it may increase the potential for ambiguity. Gudschinsky (1973:120-2) discusses some of the great difficulties which ambiguities create for the beginning reader. However, the proficient reader can tolerate much more potential ambiguity because his comprehension of the total context will serve to disambiguate the meanings of specific words.

2.4 Principle 4 - simplicity

When given a number of alternative solutions to an orthography problem, the solution which yields the simplest orthography is to be preferred.

Powlison (1968:80) discusses simplicity as one of four key characteristics of an efficient orthography. He makes the point that, "no writing system completely represents the total phonemic system of its language, nor is such total representation necessary or desirable for an efficient orthography" (1968:77). Imagine an English orthography in which stress was marked and intonation contours were marked by assigning a pitch level to each syllable. Further meaning could be conveyed by indicating speed, volume, and tone of voice. The resulting orthography would confuse more than it would clarify, even though it would unambiguously communicate much fuller meaning. There is a point at which symbolizing additional contrasts, whether they are segmental or suprasegmental, has no advantage and is more detrimental than helpful.

Thus we see that the simplicity of an orthography is related to its readability; symbolizing too many contrasts may clutter and obscure the written message. Simplicity is also related to the teachability (and learnability) of an orthography. Each additional symbol in an orthography is an additional item that must be taught and learned.

Of course the other side of simplicity is minimal potential ambiguity. Anytime an orthography is made more simple, the potential for ambiguity is increased. Anytime potential ambiguity is decreased by introducing an additional symbol, the orthography becomes less simple. There is a constant oscillation between simplicity and minimal ambiguity, and a balance must be found.

In some cases measures can be taken to combat the potential ambiguity introduced by a simplification of the orthography. If the simplification results in the loss of contrast in only a few key pairs of words, Powlison (1968:80) suggests that the contrasts "can sometimes be restored by making arbitrary spelling distinctions between the resulting pairs of homonymous words". One could also use a paraphrase to avoid potential ambiguity whenever it would arise in a written text.

2.5 Principle 5 - convergence of skewed systems

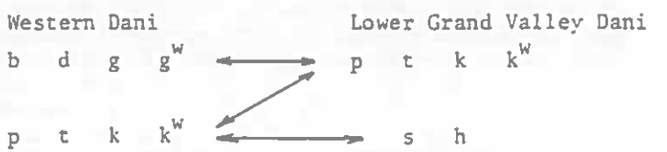
When given a number of alternative solutions to an orthography problem, the solution which finds a level of phonological structure at which skewed systems converge is to be preferred.

Under principle 2, psycholinguistic acceptability, we discussed the fact that the phonetic, phonemic, morphophonemic, and fast speech levels of phonological structuring are all psychologically real. Ideally, the orthography represents the level that is the most psychologically real in any given instance. When there is a skewing of phonological structures between dialects this is not always possible. The most psychologically real solution in one dialect need not correspond to the most psychologically real solution in another dialect. In this situation, the linguist has at least two options: (1) adopt the ideal solution for the most important dialect, or (2) attempt to find a common solution at a level of phonological structure other than the most psychologically real one.

Principle 5 states that the second option is the preferred one. The first option, though it gives the ideal solution in one dialect, forces the speakers of the other dialects to master that aspect of the orthography by rote techniques; they are forced to memorize. The second option, however, requires no memorization. The solution, though it may not be at the most psychologically real level for either group, is based on a psychologically real level of structure for both groups. As such, the solution is internalized in the linguistic competence of speakers from both dialects. Learning should be relatively easy for both groups; under the first option, learning is easy for one group but hard for the other.

Pike discusses the ramifications of this principle at the phonetic level. He states (1947:209) that representing conditioned allophones of a phoneme with separate symbols is not a very serious error, for "the native, even though he may not hear the difference, can nevertheless build up a mechanical rule which tells him when to use the one symbol or the other; it does not demand the memorization of an arbitrary list of words". Another possibility is that a mechanical rule will not be necessary at all; the speaker may become aware of the phonetic difference after it is pointed out. In either case, since the phonetic units are internalized as part of the speaker's phonological system, no memorization is required.

To illustrate convergence at the phonetic level I will use the data given by Bromley (1961) in his attempt to design a multidialectal orthography for the Dani language of Irian Jaya. Among the eight dialects which he discusses, there are two main patterns for the stop phonemes. Lower Grand Valley Dani has one stop series and two voiceless continuants, while the other seven dialects have two stop series which correspond to these. To represent the pattern of the seven dialects I will use Western Dani. The problem comes in that the correspondence between the two series of stop phonemes in Western Dani is not one to one with the stops and continuants of Lower Grand Valley Dani. The correspondence may be diagrammed as:



That is, words in Western Dani (WD) containing the voiced stops will have their voiceless counterparts in Lower Grand Valley Dani (LGV). The voiceless stops in WD will occur in LGV either as the same voiceless stop or as /s/ or /h/--WD /t/ corresponds to LGV /s/ and WD /p, k, k^w/ correspond to LGV /h/. The skewing between the phonemic system or the two dialects is apparent and to model the orthography after one system or the other would create many difficulties for users of the other dialect.

Bromley found that if these skewed phonemic correspondences were compared at the phonetic level, the result was a convergence of the patterns into a one-to-one correspondence between phones. The voiced stops of WD (which are phonetically prenasalized) correspond to the initial allophones of the LGV stops which are voiceless and unaspirated. The intervocalic and final allophones of WD (which are continuant and unreleased, respectively) correspond exactly to the intervocalic and final allophones of the LGV stops. The initial allophones of the WD voiceless stops (which are aspirated) correspond to the LGV /h/ and /s/ as described previously. The resulting correspondences, along with the orthographic symbols suggested by Bromley (1961:77-8) can be diagrammed as:

	Western Dani					Lower Grand Valley Dani					Proposed Orthography
	m_b	n_d	n_g	$n_g{}^w$	⟷	p	t	k	k^w	initial	b d g gw
intervocalic	ɓ	ř	g	g^w	⟷	ɓ	ř	g	g^w	intervocalic	
final	p	t	k		⟷	p	t	k		final	p t k kw
initial	p^h	t^{sh}	k^h	k^{wh}	⟷	h	s	h	h		ph ts kh kwh

Principle 5 works at the morphophonemic level when different dialects have different phonemic realizations of the same underlying morphophoneme. In this case, the principle requires that the morphophonemic level be symbolized in the orthography. The readers will then have the opportunity to apply the phonemic realization rules that operate in their own dialect without being confused by the realization that is already printed on the page. We can illustrate this with a simple example from the Biliau language of the Madang Province, Papua New Guinea (from personal field notes). There are two main dialects of Biliau, the eastern and the western. The following is a paradigm of the word 'forehead' in the two dialects with the singular possessive suffixes. The forms are given in a phonemic orthography.

Eastern	Western	
damow	*damow*	'my forehead'
damom	*damom*	'your forehead'
damoy	*damay*	'his forehead'

This kind of difference in the third person form is common throughout the language. The orthography problem here is whether to follow the eastern or the western dialect in spelling the word. The eastern spelling of *damoy* would cause some confusion to the western readers, and the western spelling of *damay* would cause some confusion to eastern readers. This problem of a skewing at the phonemic level is resolved at the morphophonemic level, however. By comparing the third person form of the western dialect with the first and second person forms we see that the final vowel of the root has a morphophonemic alternation between the phonemes /o/ and /a/. By comparing them with the eastern forms in which the root final vowel does not vary, we posit that the vowel at the underlying morphophonemic level is /o/. The alternation with /a/ in the western dialect is conditioned by the /-y/ suffix. Thus we see that the skewed phonemic patterns converge to the single vowel /o/ at a morphophonemic level. By principle 5, then, the *damoy* solution is to be preferred to the *damay* solution, and each reader can make his own phonemic realization of the written morphophonemic form.

An example of principle 5 working at the fast speech level is also found in the Biliau language. In both the eastern and western dialects of the language, the five vowels /a, e, i, o, u/ occur, plus

the double vowel /aa/. /aa/ is pronounced with a lenis glottal stop separating the two vocoids--that is, /maan/ 'bird' is pronounced [ma'an]. The fact that /aa/ contrasts with /a/ is shown by the following minimal pairs from Biliau village (western dialect).

wag 'canoe'
waag 'drum'

sam 'canoe outrigger'
saam 'sky'

mam 'father'
maam 'a species of fish'

In the eastern dialect, /oo/ and /ii/ occur as well.

diig 'stick'
wiil 'yam'

aroor 'net bag'
yidoom 'night'

The complication comes in the fact that where one dialect has a double vowel, the other dialect may not. This lack of agreement between dialects seems to be the rule rather than the exception, as the following examples illustrate.

Western	Eastern	
baal	*bal*	'dove'
dagalaaw	*dagalaw*	'my thigh'
aay	*ay*	'tree'
gab	*gaab*	'gather'
kak	*kaak*	'elder brother'
sam	*saam*	'canoe outrigger'

This is a clear example of skewing between the phonemic systems of the two dialects. If a phonemic solution from one of the dialects is chosen, speakers of the other dialect will have difficulties with the orthography. When reading, /a/ could be either /a/ or /aa/, and /aa/ could be either /a/ or /aa/. For writing, the problem is even worse. To learn how to spell words with /a/ or /aa/ could be done only by memorization.

At the fast speech level, however, there is a convergence of phonological structure and a common solution. In fast speech, the double vowels are pronounced as single vowels. The phonemic contrast between double and single vowels is neutralized at this level. Thus the /baal/ of the western dialect and the /bal/ of the eastern dialect are both realized identically as [bal]. Therefore, to represent all double vowels as single vowels in the orthography, results in a solution in which the standard spellings are phonologically correct (at the fast speech level) for both dialects.

2.6 Principle 6 - phonemic contrast and neutralization between dialects

When given alternative solutions to an orthography problem involving phonemic contrast and neutralization between dialects, the solution which symbolizes the contrast is to be preferred for the sake of the reader, while the solution which symbolizes the neutralization is to be preferred for the sake of the writer.

When comparing the phonemes of two dialects, it is often the case that what is one phoneme in one dialect will appear as two different phonemes in the corresponding words of the other dialect. This is what is meant by phonemic contrast and neutralization between dialects--what is contrasted phonemically in one dialect is neutralized in another.

An example of such a situation is found between the two dialects of the Biliau language. In the western dialect /d/ and /z/ are separate phonemes. In the eastern dialect only /d/ occurs; every occurrence of /z/ in the western dialect has /d/ in the corresponding word from the eastern dialect. The /d/ has no allophones in either dialect. The following examples illustrate the contrast in the western dialect and the neutralization in the eastern dialect.

Western	Eastern	
damom	*damom*	'my forehead'
zamom	*damom*	'rotten'
der	*der*	'a cold wind'
zer	*der*	'grass skirt'
badi	*badi*	'get up'
bazi	*badi*	'feather'

The principle states that the solution which symbolizes the contrast is to be preferred for the sake of the reader. Thus if /d/ and /z/ are both symbolized according to the usage in the western dialect, the solution favours the readers. In the western dialect there will be no difficulties either reading or writing, since the solution is phonemic for them. In the eastern dialect this is not so. Writing will be difficult since the only way they can learn standard spellings is to memorize them. Reading will not be difficult, however. Every time they see a /z/ they are taught to pronounce a /d/. Thus the overall advantage is toward the reader.

The solution which symbolizes the neutralization is to be preferred for the sake of the writer. Thus if only the /d/ symbol is used according to the usage in the eastern dialect, the solution favours the writer. In the eastern dialect there will be no difficulties either reading or writing since the solution is phonemic for them. In the western dialect this is not so. Reading will be more difficult because every time they encounter a /d/ they must determine

if it is phonemically a /d/ or a /z/ for them. Writing will not be difficult, however. They will use the /d/ symbol for both the /d/ and the /z/ phonemes. Thus the overall advantage is toward the writer.

In the case of phonemic contrast and neutralization between dialects, we see that there is no one best solution. There is a conflict of interest between favouring the reader and favouring the writer. The linguist must determine which is more important in the specific situation.

2.7 Principle 7 - overall least effort

When given a number of alternative solutions to an orthography problem, the solution which promises the overall least effort is to be preferred.

Overall effort is measured by the amount of time required for an illiterate to become fluently literate. Once a reader has become fluent, there is no effort involved in an orthography. This is evidenced by the fact that the fluent reader of English or Chinese can read just as well as any reader of a "phonemic" orthography. The effort involved in an orthography is in learning to use it. If the English orthography were strictly phonemic, there would be no need in American schools to still be having spelling classes in the eighth grade.

The greater the overall effort required to master an orthography, the greater is the overall cost of conducting a literacy programme. This cost is realized in at least two ways: the cost of losing students and thus failing to produce readers, and the actual expense in terms of time, teachers, and equipment required for conducting the programme. The cost in terms of losing students is the more serious. Ability to succeed in becoming a fluent reader is largely governed by motivation. In a very real way, the effort required to learn can affect one's motivation. Difficulties and long periods without any seeming progress can lead to frustration and discouragement. These in turn may lead to loss of motivation and giving up. The less time and effort required to gain mastery, the greater the chances that the individual student will succeed.

3. A QUANTITATIVE METHOD FOR COMPUTING OVERALL EFFORT

Now we consider how principles 1 through 6 relate to the principle of least effort. As we consider each of the principles, I will suggest a method of quantifying the relative effort required by each of the solutions. The method is still very tentative. It is hoped that the input received from field studies using this method will be able to suggest refinements.

The results of the relative effort computations are recorded in a table. The rows of the table are labelled with the possible solutions being considered. For each of the dialects being considered there is one super-column. Each of these super-columns is subdivided into seven columns--one for each of the first six principles and a final one for recording the total effort for the dialect. A sample record sheet for a problem with three solutions and three dialects is as follows.

Table 1. Sample record sheet

	Dialect A							Dialect B							Dialect C							Overall Effort			
principles	1	2	3	4	5	6	T	1	2	3	4	5	6	T	1	2	3	4	5	6	T	A	B	C	T
Solution 1																									
Solution 2																									
Solution 3																									

In the boxes on the record sheet is recorded the relative effort required by a particular solution in a particular dialect with respect to a single principle. In the total columns for the dialects, the sum of the efforts for all six principles is recorded. This then gives the relative total effort required by a solution in that dialect. The overall effort super-column is for summarizing the total effort. The dialect totals are copied into the appropriate boxes and then summed to give the total overall effort, with respect to all the principles in all the dialects, for each possible solution. By principle 7, the solution with the lowest overall effort is the best solution to select.

Now we shall consider the principles one by one and suggest a scale for quantifying relative effort for each principle. In each scale the lowest values represent least effort and the highest values are most effort. The scales given here are suggestions to be followed as an initial guideline. In applying the method, the investigator may discover that he needs more degrees in a scale, fewer degrees in a scale, or a different assignment of values to the degrees in a scale. The investigator might also want to weight the effort values. If a particular principle is felt to be more or less important than the others, its effort values could be multiplied by a constant to adjust its weight accordingly. Total effort values for the dialects might also be weighted to reflect the size or prestige of the different dialects. The investigator is encouraged to make any modifications that seem necessary.

Principle 1 - social acceptability. A solution which is perfectly acceptable is, of course, the least effort solution; thus it receives a score of 0. A solution which is totally unacceptable is maximum effort and is actually an impossible solution. An arbitrarily high value must be assigned to such a solution. The value 10 is suggested here, but a higher one may be necessary. At least three degrees of acceptability in between can be distinguished: reluctantly acceptable,

which receives a value of 1; possibly troublesome, which scores 2; and definitely troublesome, which scores 4. It is felt that the amount of effort required for a definitely troublesome solution as compared to a possibly troublesome one, is much greater than the difference of effort required between a reluctantly acceptable solution and a possibly troublesome one. Thus the jump in the scoring from a value of 2 to one of 4.

Principle 2 - psycholinguistic acceptability. A solution which is the most psycholinguistically acceptable is the least effort solution and receives a score of 0. A solution which is acceptable but not the most acceptable scores 1. A solution which will possibly cause difficulty scores 2. A solution which will definitely cause difficulty scores 4. Finally, a solution which is psycholinguistically impossible scores 10.

Principle 3 - minimal potential ambiguity. Increase and decrease of potential ambiguity is calibrated with respect to the dialect being considered. The score of 2, no change in potential ambiguity, means that the given solution neither increases nor decreases potential ambiguity and 0 means a definite decrease in potential ambiguity. Conversely, 3 represents a slight increase in potential ambiguity and 4 is a definite increase. Two degrees of decrease and two degrees of increase are suggested in the case that one solution may offer a greater degree of increase than another, or that a particular solution may show a greater degree of increase in one dialect than in another.

Principle 4 - simplicity. Increase and decrease in simplicity, too, is calibrated with respect to the dialect being considered. The score of 2, no change in simplicity, means that the given solution neither increases nor decreases simplicity from what it would be in a complete orthography designed solely for that dialect. The score of 1 means that the solution offers a slight increase in simplicity and 0 means a definite increase in simplicity. Conversely, 3 represents a slight decrease in simplicity and 4 is a definite decrease.

Principle 5 - convergence of skewed systems. The solution at the most psycholinguistically real level is the least effort solution and so scores 0. In principle 5 it is stated that a solution at a common level of phonological structure is to be preferred to a solution which requires arbitrary memorization for at least one dialect. Thus the total effort for a common solution must be less than the memorization one. A solution scores 1 if is a common level solution for that dialect--that is, it represents a psychologically real level of structuring, yet not the most real level. A solution which requires some memorization scores 3. Thus a solution which finds a common level for two dialects (total effort of 2) is less effort than a solution which is psycholiguistically the best for one dialect but requires some memorization in the other dialect (total effort of 3). A solution which requires a great deal of memorization scores 4.

Principle 6 - phonemic contrast and neutralization between dialects. Before scoring the effort for this principle, the investigator must determine whether advantage toward the reader or advantage toward the writer is of prime importance. After this has been decided the effort values can be assigned. The score of 2 means that the solution is of no advantage or disadvantage to the reader/writer--it makes no difference. The score of 1 means that the solution is slightly advantageous. The score of 3 means that the solution is slightly disadvantageous to the reader/writer, and 4 means that it is definitely disadvantageous.

A summary of the scales for quantifying relative effort is given in Table 2.

Table 2. Scales for quantifying relative effort

1. Social acceptability

   0 perfectly acceptable
   1 reluctantly acceptable
   2 possibly troublesome
   4 definitely troublesome
   10 totally unacceptable

2. Psycholinguistic acceptability

   0 psycholinguistically most acceptable
   1 acceptable
   2 possibly difficult
   4 definitely difficult
   10 impossible

3. Minimal potential ambiguity

   0 definitely decreases potential ambiguity
   1 slightly decreases potential ambiguity
   2 no change in potential ambiguity
   3 slight increase in potential ambiguity
   4 definite increase in potential ambiguity

4. Simplicity

   0 definitely increases simplicity
   1 slightly increases simplicity
   2 no change in simplicity
   3 slightly decreases simplicity
   4 definitely decreases simplicity

5. Convergence of skewed systems

   0 psycholinguistically most acceptable
   1 common level of structure solution
   3 solution requiring some memorization
   4 solution requiring much memorization

6. Phonemic contrast and neutralization between dialects

   0 definitely advantageous to reader/writer
   1 slightly advantageous to reader/writer
   2 makes no difference
   3 slightly disadvantageous to reader/writer
   4 definitely disadvantageous to reader/writer

In Table 3 there is a sample overall effort computation for the /d/ versus /d/ and /z/ orthography problem in the Biliau language described under principle 6. Table 4 is a sample overall effort computation for the orthography problem concerning the double vowels in the Biliau language described under principle 5. The following paragraph explains how the relative effort values were assigned for the first example.

Table 3. The /d/ and /z/ problem in Biliau

	Western dialect							Eastern dialect							Overall effort		
	1	2	3	4	5	6	T	1	2	3	4	5	6	T	W	E	T
1. /d/ and /z/	0	-	2	2	-	2	6	1	-	1	3	-	2	7	6	7	13
2. /d/ only	2	-	3	1	-	3	9	0	-	2	2	-	2	6	9	6	15

Table 4. The double vowel problem in Biliau

	Western dialect							Eastern dialect							Overall effort		
	1	2	3	4	5	6	T	1	2	3	4	5	6	T	W	E	T
1. Distinguish double vowels as used in western dialect	0	0	2	2	0	-	4	1	4	2	2	3	-	12	4	12	16
2. Distinguish double vowels as used in eastern dialect	2	4	2	2	3	-	13	0	0	2	2	0	-	4	13	4	17
3. Symbolize all as single vowels	0	1	3	1	1	-	6	0	1	3	1	1	-	6	6	6	12

The problem concerning /d/ and /z/ is primarily one of phonemic contrast and neutralization. There are two possible solutions--to represent the contrast of /d/ and /z/ as is done in the western dialect, or to represent the neutralization with just /d/ as is done in the eastern dialect. Before quantifying the social acceptability it must first be noted that the western dialect has a true ascendency in terms of prestige. In Biliau, the key village of the western dialect, there is a primary school, a medical aid post, an airstrip, a church, a large

trade store, and it is a regular port for a major shipping line in the Madang area. Of a comparable nature, the eastern dialect has only a church and a small trade store. To represent the neutralization would be perfectly acceptable in the eastern dialect but possibly troublesome in the western dialect. To represent the contrast would be perfectly acceptable in the western dialect. It might even be perfectly acceptable in the eastern dialect, though we will score it as reluctantly acceptable.

It is felt that psycholinguistic acceptability and convergence of skewed systems are not directly relevant to the problem. The problems of acceptability and arbitrary memorization are certainly relevant in one sense; however, they must be gauged either with respect to the reader or to the writer. Results will differ in either case. Since it is primarily a problem of reader versus writer, the scoring of this aspect of the problem is reserved for the principle of phonemic contrast and neutralization.

As to the potential ambiguity, the /d/ and /z/ solution makes no change in the western dialect since this is the phonemic solution in that dialect. However, for the eastern dialect, this solution would offer a slight decrease in potential ambiguity. The /d/ solution, being the phonemic solution for the eastern dialect, would offer no such change for that dialect, though for the western dialect it would entail a slight increase in potential ambiguity.

In terms of simplicity, the /d/ and /z/ solution in the western dialect offers no change since this is the phonemic solution for this dialect; the /d/ solution offers a slight simplification in the orthography. In the eastern dialect, the /d/ solution offers no change since it is the phonemic solution; the /d/ and /z/ solution introduces a slight decrease in simplicity into the orthography for the eastern dialect speakers.

For principle 6, we first determine that the advantage to the reader is more important for our applications than advantage to the writer. In the eastern dialect, the /d/ solution makes no difference since it is the phonemic solution. The /d/ and /z/ solution should also make no appreciable difference to the readers of the eastern dialect; they simply must be taught to pronounce all /z/ sumbols as /d/. It should not introduce reading difficulties. In the western dialect, the /d/ and /z/ solution makes no difference since it is the phonemic solution. The /d/ solution would involve a slight disadvantage to the readers for they would have to determine if it was really their phoneme /d/ or /z/.

In the totals for overall effort, we see that the contrast solution has a relative effort of 6 in the western dialect as opposed to 9 for the neutralization solution. In the western dialect, the neutralization solution has an overall effort of 6 as opposed to 7 for the

contrast solution. Considering overall effort with respect to the whole language group, we see that the contrast solution has an overall effort of 13, whereas the neutralization solution has an effort of 15. Thus by principle 7, the contrast solution--to symbolize /d/ and /z/ according to the usage of the western dialect--is to be preferred.

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Popularizing the Northern Khmer orthography: Sociolinguistics in Action

Workshop on Northern Khmer orthography*
Surin, 23-24 April 1987. 26-27 May 1988. 22 March 1989.

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1. Introduction
2. Background
3. Problems and Decisions

1. Introduction

There are upwards of a million people in northeastern Thailand who speak a dialect of Khmer. Various attempts at writing it have been made by individual native speakers, and a reasonable orthography using Thai letters had been worked out for this Northern Khmer language[1] (henceforth N.K.) by William Smalley and John Ellison.[2] This orthography has been used, with some adaptations, for about 15 years.[3] A few things had been published.[4] However, there are so many problems and varieties of possible solutions, plus interference from the Cambodian script for Standard Khmer, that there had been some objections raised recently by influential northern Khmer people.

The hope was to get a consensus from the people themselves and to get interest stirred up in writing this dialect of Khmer with a minimum of conflict with the Thai writing system, yet efficient for N.K. Many of the N.K. speaking villagers, although somewhat fluent in spoken Thai, dropped out of school after grade four, and are now only semi-literate. So such an orthography would give the villagers a boost in reading ability in general, as well as aiding in rural community development and health programs and for the recording and preservation of their culture.

So on April 23-24, 1987, May 26-27, 1988 and March 22, 1989, conferences were held in Surin Province, the heart of the N.K. area in Thailand, to try to finalize an orthography. The first two conferences were sponsored by the Institute of Language and Culture for Rural Development of Mahidol University and were chaired by Dr. Suwilai Premsrirat of the Institute. At the first meeting there was a preponderance of delegates from Surin, but the next year there was a more balanced representation of Buriram and Srisaket provinces. Many delegates were local officials who speak N.K. themselves, and they were very interested and concerned, especially those from

MON-KHMER STUDIES 16-17:255-272(1990)

the Department of Non-formal Education. The last conference was held in conjunction with a writers' workshop, and was jointly sponsored by the Mahidol Institute and the local office of Non-Formal Education in Surin.

2. Background

Some of the problems of writing N.K. are accidents of history, some are because of language differences, and some are psycholinguistic. And of course these are intertwined.

The northern Khmer people have been cut off politically from the southern Khmers of Cambodia for a long time and the mountains form a natural barrier to frequent interaction with the Cambodian Khmers. The approximately one million speakers of N.K. are concentrated in Surin province, just north of the Cambodian border, but there are also many in the provinces east and west of Surin. The people see themselves as Thais who speak Khmer.

With such a large number of speakers, the N.K. language shows no signs of dying out. In Surin Province, the Khmer speakers are even in the majority, and although in most of the high schools the students are fined for speaking N.K., grade school teachers have a real problem with the young Khmer speaking pupils from the villages because they really don't know Thai when they start school. There are many well educated Khmer in high positions, including the (now) former provincial governor of Surin, the mayor of Surin City, and many local officials. The Khmer are not embarrassed to use their language in many public situations, but for official communication they use Thai.

Orthographically, the language with the strongest influence on N.K. is Standard Thai. The area also has a lot of Lao and Kuy villages, and some people speak all three languages, plus Standard Thai. However, the Lao orthography is not well known here so it has little influence on the writing of N.K. Kuy is very non-prestigious, so it also has had little influence on Khmer. Although N.K. and Cambodian are closely related, for the most part, only men who learned to read Cambodian Buddhist texts while in the monkhood can read the Cambodian script. So the influence of the Cambodian script on the majority of the northern Khmers is minimal.

Historically, the Thai borrowed much from the Khmer and Mon languages and cultures. When the Thai became dominant in the area, there was a lot of influence from Thai on Khmer so now there are many borrowings and reborrowings in both directions,[5] including Sanskrit and Pali words from the Buddhist literature. The ancient system of writing borrowed words seems to have been as in English: write the borrowed word as it is written in the donor language, not as it is pronounced in the receptor language. So now words borrowed at different times or from an intermediate donor are spelled differently, especially in Thai, although the meanings, and sometimes even the pronunciation, may be identical or closely related. Furthermore, although the Mon, Cambodian and Thai scripts are all derived from the Pallava script of India, each one developed differently. The languages of the region have developed a lot of extra letters as well as the irregular spellings. So one question is: how should N.K. spell these words?

Even a Thai child takes about as long to learn to read as his counterpart does in the English language. This creates an unbearable load for the beginning Khmer pupils. For a Khmer child to learn to read in his own language first would be a distinct advantage, but the likelihood that he would have a long period with Khmer classes in school is rather slim. So to have a fairly one-to-one correspondence between phonemes and graphemes in a N.K. orthography would be a big help for the children. However, some of the extra letters are conditioned in Thai, so although they may add an extra teaching load, they are not a big problem. And using them would aid in transfer between the two writing systems. So a completely one-to-one correspondence may not be necessary in N.K.

3. Problems and Decisions

3.1. Word level. the most surprising decisions of the conference were to write word spaces and where to position certain vowels. Both these decisions are very non-Thai, but the Khmer realized the ambiguities they would eliminate.

Thai writing has only minimal marking of word boundaries, making it sometimes difficult to identify word breaks. Unless the context is clear, you don't know if there is an open syllable, followed by an initial consonant cluster, or a closed syllable followed by a single (or double) consonant. Since N.K. has more possible consonant clusters and more complicated ones than Thai, the problem is multiplied without word breaks. The computer also needs word breaks for easy processing.

Certain vowels in Indian-derived scripts are written before the consonant that actually precedes them phonetically and phonemically (in some cases in Thai, and more often in N.K., this is complicated for two reasons. If there is a consonant cluster, Thai writes the vowel to the left of the whole cluster.

So it is not clear if there is one word with a consonant cluster or two words, one with the preposed vowel and one with the unwritten vowel. The Khmer decided to write word breaks, so this problem will not exist, but there is also a problem with simple three phoneme syllables with these preposed vowels. Are they CVC or CCV? There is at least one minimal pair in N.K. which really is ambiguous if vowels are written before clusters, but even for other words it will make reading simpler for a new reader to know at a glance if there is a consonant cluster or not. So it was decided to write these vowels before the consonant closest to the syllable nucleus.

3.2. Morphophonemically there are also a few problems, some similar to Thai, some not.

1) As in Thai, when there are two nouns in a noun phrase, if the first one has a long vowel, it is shortened. Thai writes these vowels consistently as long. This problem was not actually discussed, but undoubtedly the Khmer will want 'words spelled consistently'.

Thai treats these phrases as compound words: in citation form, no spaces between words; for line breaks, hyphenation between syllables. However, although the Khmer recognized some possible ambiguities, in 1989 they decided to write separate words.

2) N.K. has several functors which are unstressed open syllables, and the vowels are not clear. They are really clitics, but when written as an unstressed syllable of an adjoining word, they form an unusual word pattern. When written as a full word, they get too much stress. In Thai, similar functors can end with a final glottal when stressed, and are written with a glottal, although they frequently end in light aspiration or an open syllable. But this solution doesn't work for N.K. because /-ʔ/ and /-h/ are both in strong contrast with an open syllable.

At the 1988 conference it was decided to connect the clitics to the main word. But the 1989 conference reversed this decision, again showing the strong desire for breaks. As this conference was in conjunction with the writers' workshop, the delegates had had some experience in reading and writing following the previous decisions.

3) There is one functor /koʔ/ which functions almost exactly like an analogous functor in Thai, but sounds a little different, especially when stressed. The Thai functor is written with no vowel but with the sym[illegible] for shortening a vowel (ก็). This is a particularly good solution for this functor in Thai because it looks so unusual, and it is a very common functor. For now they will try writing the N.K. functor as in Thai. People who see it for the first time usually read it as pronounced in Thai, but when they know it can be pronounced as in Khmer, they are satisfied. There is one problem for N.K. in that there is also a very common pronoun which has a somewhat similar shape (ก็). Since this writing for the functor was adopted, some people have confused the two words.

4) Unlike Thai, sentence intonation is very important in N.K., usually affecting the last word of a clause. Thai does not use punctuation marks, and has only a break in the type to show sentence breaks. The conference was definite that they want more clause breaks written than in Thai.

There is a special intonation pattern for yes-no questions. It is either a lengthened final syllable or an added vowel. The added vowel does not form a true syllable as there is no initial consonant and it is unstressed. Instead of writing the question intonation-syllable, they will use the question mark.

3.3. Proper names are very frequently borrowed from Thai, Pali or Sanskrit. For personal names, people will probably want to write them as in Thai, but for geographical names they decided to write them first in N.K. style and then in Thai in parentheses. This will also be helpful when the N.K. name is actually different from the Thai name.

3.4. Literary loanwords will be written as pronounced in N.K., but followed by the Thai spelling in parentheses. Words like /thammada/ 'commonly', which have a double medial m will be written with the final am symbol +m-. (This particular word in Thai is written with a special symbol for th and a double r for the am, but would be written in N.K. as ทำมดา [ธรรมดา]).

3.5. Northern Khmer sounds and symbols

The phonemic inventory of N.K. is as shown in Figure 1.

Consonants					Vowels		
ph	th	ch	kh	h*	i, ii	ɯ, ɯɯ	u, uu
p	t	c*	k		ɪ, ɪɪ	ɤ, ɤɤ	ʊ, ʊʊ
b	d				e, ee	ɔ, ɔɔ	o, oo
m	n	ɲ	ŋ		ɛ, ɛɛ	ʌ, ʌʌ	ɔ, ɔɔ
		r*				a, aa	ɒ, ɒɒ
		l*			iə, iiə	ɯə(ɯɯə)	uə, uuə
(f-in loans)		s					
w		y					

Figure 1 Phonemes of Northern Khmer

Sounds not occurring in Thai are underlined. Consonants marked with an asterisk do not occur finally in Thai but do in N.K. /s/ is only initial in both languages. The length of the central off-glided vowel is predictable in Thai so it is written as a long vowel in Thai. However, in N.K. it is usually short, with the long vowel occuring in only one word.

1. Consonant symbols

	labial	alv.	palatal	velar	glottal
asp.stop	ผ	ท	ฌ	ค	
unasp.stop	ป		ช	ก	อ-/-ะ,-ก
vd.stop	บ	ด			
nasal	ม	น	ญ	ง	
trill		ร			
lateral		ล			
fricative	(ฟ)		ซ		ห
semivowel	ว		ย		

Figure 2
1988 Northern Khmer Orthography - Consonants

One non-problem is what to do with the two sets of consonants in Thai which represent tonal classes. Everyone recognizes that N.K. has neither tones nor vowel register distinctions, so the set for mid tone is used. Another non-problem is the final voiceless stops: in Thai they are written as voiced stops. But in neither language is there voicing contrast in the final position so it doesn't matter. The real problems for the consonants are the phonemes that are only word-initial in Thai, and the one phoneme that doesn't

exist in Thai.

Although the palatal nasal does not occur in Central Thai at all, Thai does have a letter that represents /y/ initially and /n/ finally, and in some dialects of Thai it is actually pronounced as a palatal nasal. So it is a natural symbol for the N.K. palatal nasal. However, there is a problem because after front vowels in most dialects of N.K. there is no contrast beween the palatal and velar nasals. Except for Khmers who are very phonetically sophisticated, psychologically they are convinced that they are saying a velar. The tongue tip is clearly behind the lower teeth, causing the tongue to hump in the middle, and the phonetics professor assured the delegates that they were actually saying a palatal, but they remained unconvinced. At the first conference they side-stepped the issue, but at the 1988 conference they decided to write the velar symbol following front vowels. The only problem that concerned those who had finally realized how they pronounce the consonant was whether writing a velar for what is a really palatal would confuse their children. During the following year there was a strong reaction against writing the velar for the palatal. So in 1989 they decided that they would write the palatal, at least for widespread printing, and locally people could do as they liked.

The final gutturals cause a problem because in Thai the final glottal stop sometimes is realized as [h], and in N.K. the final glottal stop is sometimes realized as [k]. Thai has no phonemic final /h/, but N.K. does. Many dialects of N.K. have no phonemic final /k/.

However, the k-ʔ contrast may be coming in from Thai, and there is a strong preference for writing /k/ after the short central and back high vowels. Thai has no glottal stops after long vowels, but N.K. does. So in the Smalley-Ellison orthography the Thai symbol for /k/ is used after long vowels. Probably they will continue using the /k/ symbol after the long vowels. After the short high central and back vowels, although they usually say a glottal, many Khmer are convinced that they are saying a velar. So the conference decided to write the velar instead of a glottal after the short high central and back vowels, although the Khmers who are used to writing in the existing orthography do balk at the arbitrary spelling.

The final /h/ came in for much discussion because it is so non-Thai. A few Thai words are written as if they had a silent /h/, but a different symbol is used from the one used initially for words with level tones. To complicate matters, Cambodian uses an /s/ symbol for final /h/. But eventually the symbol

used for initial /h/ in N.K. was adopted.

Surprisingly, there was little discussion of the final /r, l, c/. Although Thai does not have these finals, there are comparable symbols used finally in Thai, but they are pronounced as /n, n, t/. Some minimal pairs were presented and everyone seemed satisfied to write the phonemes as pronounced in N.K. The Khmers know that the Thai pronounce these sounds wrong when they try to speak N.K.

Consonant clusters are not written consistently in Thai. They decided to write them consistently, regardless of whether there is a slight open transition between the consonants or not.

Syllabic nasals are not very common in N.K., but they do occur before consonants in some words. The 'obvious' solution of just writing a simple nasal is not acceptable because it would be read with an intervening (unwritten) vowel. The Smalley-Ellison solution of writing as if there were a presyllable /ʔaN/ was adopted, although it does take some learning.

2. Vowel symbols.

The symbols chosen for the vowels are shown in Figure 3.

	short ʔVd ʔVʔ	long Vd	short ʔVd ʔVʔ	long ʔVd V#	short ʔVd ʔVʔ	long Vd
high	อิค/อิ	อีค	ฤค/อึก	ฤค/ฤอ#	อุค/อุก	อูค
high open	อึ๋ค/อึ๋	อือค	อึ๋ค/อึ๋ก	อึ๋ค/อึ๋อ#	อึ๋ค/อึ๋ก	อึ๋ค
mid	เอ็ค/เอะ	เอค	เอีค์/เออะ	เอีค์/เออ#	ออค/โระ	โอค
mid open	แอ็ค/แอะ	แอค	แอึ๋ค์/เอึ๋อะ	เอึ๋ค/เอึ๋อ#	ออค/อะ	ออค
low	(อัค, เอา, อำ, ไอ)/อะ*		อาค/อา#		อึ๋อุค/อึ๋อุะ	ออุค
glided	เอียค	เอียค	เอือค	(เอือค)	อำค/อำ#/อำะ	อำค

-d = any consonant but glottal
*The varient symbols for short /a/ represent:
/ʔad, ʔaw, ʔam, ʔay and ʔaʔ/

Figure 3
1989 Northern Khmer Orthography - Vowels

As an aid to visualizing the positions of the vowels, the examples show an initial glottal and either a final d or a final glottal. (Note that the symbol for initial glottal is the same as for parts of the mid-central vowels and the low back vowels.) Final glottal is unwritten after some short vowels. For open syllables (indicated here with #), some long central vowels add the symbol for initial glottal/low back vowel after the vowel. The shortener (ั) has to be used on more vowels than in Thai.

The one vowel that was radically changed was the open mid-central vowel. Formerly it was written อึ๋, as the central counterpart of the open mid front vowel (building another symbol onto the front symbol, as is already done for the close vowel as in Thai), but it looks strange in loanwords. So they chose to write เอึ๋, following the pattern for lowered vowels (same symbols as the close vowels, but with the added dot beneath).

The special symbols for short /a/ before /m/, /w/, /y/ and /ʔ/ will be used as in Thai (-ำ, เ-า, ไ-, -ะ). This is especially important for /aw/ because the Thai symbol for /uu/ uses the normal expected symbols for /aw/ (-ัว). A problem may arise with the /am/ and /ay/ because in loanwords from Sanskrit-Pali, Thai writing is not consistent, and some of those very same words are common in N.K.

The central off-glided vowel is very short in N.K., but long in Thai. Time will tell whether people will consistently write the symbol for vowel shortening or not.

For the lowered vowels, the present system was accepted: a dot below the line, except when the vowel itself is already written below the line. Then a circle above the vowel is used. The only thing this changed from the previous orthography is that it had the raised circle instead of the lowered dot for the only lowered vowel which is written on the line (-อุ).

Thai usually writes the vowel shortener above the initial consonant, but this is complicated if there is already a mark there. And for the computer, this is a disaster. However, there is some precedence from Thai to shift the shortener to the right (for newspaper headlines), and since we began doing this several years ago, there has been little reaction one way or the other from the Khmer readers. Probably for handwriting, people will put the shortener on top of other diacritics, but they accepted the shifted position for printed materials.

The 1989 conference addressed the problem of limited distribution of certain short vowels in some environments. Some villages tend to one pronunciation, others to another, and some

villages may have contrast. While allowing leeway for local situations, they decided that for widespread printing one should follow these conventions:

1) [ʊ] and [o] before bilabials:

Use [ʊ] for บุ๋บ 'night', กรุ๋บ 'all', จำนุ๋บ 'stumble'

บุ๋ม 'cry', พนุ๋ม 'mountain'

[o] (the unwritten vowel)

for ตม 'overgrown', กนม 'grasshopper'

ทม large', ขม 'request', คลม 'blow',

อม 'aunt, uncle'

2) [ɪ] and [e] before palatals

Use [ɪ] for ทนิ๋ญ 'tooth', ปิ๋ญ 'full'

พลิ๋จ 'forget', กิ๋จ 'step away'

[e] for เดิ๋ญ 'know'

3) [e] and [ɪ] before /y/ use [ɪ] as in ปริ๋บ 'jungle'

4) [e] and [ɛ] before /y/ use [ɛ] as in ผแม็ย 'woman'

In 1989 they also decided how to write short vowels before glottal where the writing system is open to two possibilities and Thai uses an unusual symbol or digraph + glottal. Rather than using the shortener (ั) plus /k/, they will use the special Thai symbol for the short vowel + final /ʌ, ɒ/ (เ-ิอะ, เ-าะ) following the Thai pattern for the next higher vowels /ə, ɔ/ (เ-อะ, เ-อาะ): เพอะ 'drink' เทาะ 'hair' As in Thai, they will write a long /ɔ́ɔ/ instead of using the short, unwritten /o/ before glottal (โ-ะ): โปะ 'to filter'.

NOTES

*An earlier report on the first Northern Khmer conference was published in Notes on Literacy, [Dallas, SIL.] 1989, Vol.57, pp.47-57.

1. See David Thomas, On the "language" status of Northern Khmer. Paper presented at the Sino-Tibe[illegible] Conference, Lund, October 1988, and to appear in the Mahi[illegible] Journal of Language and Culture.

2. See William Smalley. 1976. The problem of vowels: Northern Khmer. In Phonemes and Orthography: Language Planning in Ten Minority Languages of Thailand. William A. Smalley, ed. Pacific Linguistics, Series C, No.43. pp.43-83.

3. See Dhanan Chantrupanth and Chartchai Phromjakgarin. 1978. Khmer (Surin)-Thai-English Dictionary. Indigenous Languages of Thailand Research Project, Chulalongkorn University Language Institute, Bangkok.

4. As Kheuan Singkhanipa, Suwilai Premsrirat and David Thomas. 1984. Surin Khmer Conversation Lessons. Mahidol U., Bangkok. And a four language vocabulary with Thai, Kuy, Northern Khmer and English. (by Feikje van der Haak and Brigitte Woykos). 1986. Summer Institute of Linguistics and Institute of Language and Culture for Rural Development, Mahidol U. Bangkok. (No English title is given.) Plus various scripture portions.

5. See Franklin E. Huffman. 1986. Khmer loanwords in Thai. In Papers from a Conference on Thai Studies in Honor of William J. Gedney. Robert J. Bickner, Thomas J. Hudak and Patcharin Peyasantiwong, eds. Michigan Papers on South and South East Asia, no.25. University of Michigan, Ann Arbor, MI, pp.199-209.

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from S. Marlett. 1992. An introduction to phonological analysis. NDSIL pre-pub.

Appendix B - Orthography Design

One of the reasons for which phonological analysis is done is to prepare to develop a practical writing system (orthography) that will be used by native speakers of a particular language. Many factors enter into the creation of an orthographic system—some of which are directly related to the phonological analysis and many of which are not. In the following sections some of these factors are discussed.

For those of us who have had experience with only the Roman alphabet, it is important to realize that an adequate writing system does not have to use this alphabet. If an orthography were being developed for a new language found in Greece, it would be reasonable to expect that an orthography based on the Greek alphabet would be used. But we must think even further than this. Some languages use a syllabary, where each symbol represents a syllable rather than a single phoneme. Some orthographies, such as that of Chinese, are really not based on the sound system at all. We cannot take the time here to discuss advantages or disadvantages which are found in each of these systems (including the alphabetic approach), but point out that flexibility must be exercised in this area. The discussion that follows centers around an alphabetic approach, however.

Linguistic factors

Phoneme-based vs. morpheme-based orthography

There are two basic views with respect to the visual representation of utterances. One, which we will call the phoneme-based view, emphasizes the importance of a fairly straightforward bidirectional sound-to-letter correspondence. This is illustrated by the following examples from Spanish. In the column under 'standard orthography' we present the way the words are actually spelled. In the column under 'phoneme-based orthography', we present the way the words might be spelled if each letter represented only one phoneme (and where the letter *c* represents the phoneme *k*).

	Standard Orthography		*Phoneme-based Orthography*
'I look for'	busco	(=/k/)	busco
'that I look for'	busque	(=/k/)	busce
'electric'	eléctrico	(=/k/)	electrico
'electricity'	electricidad	(=/s/)	electrisidad

You will note that the standard Spanish orthography violates the phoneme-based orthographic principle in two ways. First, the

sound /k/ is represented in more than one way orthographically--it appears as *c* in some places and as *qu* in other places. Second, the symbol *c* represents more than one phoneme of Spanish--it represents /k/ in some places and /s/ in others. The phoneme-based orthography avoids both of these situations. The letter *c* always and only represents /k/.

The second approach to orthography, which we will label the morpheme-based view, emphasizes the importance of a fairly uniform representation of each morpheme, regardless of the phonologically-conditioned allomorphs it may actually have. Compare the examples from Spanish again:

Standard Orthography	*Morpheme-based Orthography*
busco	busco
busque	busce
eléctrico	electrico
electricidad	electricidad

The standard Spanish orthography violates this principle in one way -- the root 'look for' has two spellings: *busc-* and *busqu-*. The morpheme-based orthography has only one shape for this root.

The differences between a phoneme- and a morpheme-based orthography show up when a morpheme has two or more allomorphs, as illustrated by their respective representations of the words for 'electric' and 'electricity' above. (The phoneme-based view has *c* alternating with *s*; the morpheme-based view has *c* in both words.) Allomorphy invariably means different spellings in a phoneme-based orthography, but not in a morpheme-based orthography.

Certain factors affect the appropriateness of a morpheme-based approach in a given case. Phonological changes that are not regular would have to be indicated somehow. It would be inappropriate, for example, to spell the plural of leaf as leafs just to maintain morpheme invariance. The voicing of the /f/ in the plural is not part of the regular sound pattern of English, as we noted in chapter 8.

These two basic approaches to orthographic representations will be compared below with respect to three features of an optimal orthography that are proposed by Klima.[1]

Low degree of arbitrariness

Since the correlation of meaning to sound is already arbitrary, there is no reason to introduce an additional aspect of ar-

[1] Edward Klima, How Alphabets Might Reflect Language (publication data unknown).

bitrariness. That is, it seems reasonable for an orthography to reflect the phonological structure of morphemes. Thus the morpheme for a canine animal should be represented by some symbols, such as *d-o-g*. A close correlation between sounds (at the underlying, lexical, or surface level) and spelling therefore results in a low degree of arbitrariness. Arbitrariness in the English orthography is illustrated by the use of the letter *a* in some monosyllabic words to represent the phoneme /æ/, as in *bad, wag, cat*, but to represent the phoneme /a/ in other monosyllabic words, as in *wad, what*, and *watt*.

Arbitrariness is also reflected by the use of more than one orthographic representation per phoneme, as in the use of oa and oCe to represent the same sounds, as in boat and hope.

Expressiveness

Another characteristic of an optimal orthography is expressiveness. When two words such as the verbs *lead* [liyd] and *lead* [lɛd] have the same orthographic representation, the orthography is not as expressive as the sound system. Homophones which are spelled differently, such as *meat, mete*, and *meet* illustrate the fact that English orthography is more expressive than the (present-day) sound system--which might be considered a positive feature in that semantic differences are thereby reflected in the orthography. This is achieved only at an increase in the degree of arbitrariness, however. (The English orthography is also expressive in that it preserves written contrasts which are maintained in only some dialects--e.g. *Mary, merry, marry*.) A language may systematize a way to increase expressiveness, as in the use of capital letters (e.g., *Bill* vs. *bill*) or accents (e.g., Spanish *más* 'more' vs. *mas* 'but').

Economy

A third feature of an optimal orthography is economy. The economy principle is that the orthography should not duplicate the predictable variation that the sound system has. Phoneme-based and morpheme-based orthographies both hold to the economy principle, but they differ with respect to the degree to which they hold to it. A phoneme-based orthography would agree to "economize" in the orthography by not representing variations in a sound which is everywhere determined by its environment. Thus all of the allophones of /t/ in English—aspirated, unreleased, unaspirated, glottalized, and flapped--are represented by only one symbol — *t*.

A morpheme-based orthography would want to "economize" in the orthography by not representing in the orthography any change that is anywhere predicted by a regular phonological rule. Thus such spellings as *rota[t]e : rota[t]ion, paradi[g]m : paradi[g]matic, colum[n] : colum[n]ar* are viewed as the proper application of the economy principle. The reader learns to associate only one visual sequence with each morpheme; the reading process

thereby avoids a trip through the phonology. The maximizing of the economy principle comes at the expense of expressiveness in some cases, however. For example, the spelling for [reyšyo] could be motivated to be *ratio* by deriving it from *rate* plus the suffix *-io*. The spelling of the words *ratio* (< {rat} + {io}) and *patio* (< {patio}) now conceal their different pronunciations since the English orthography, like most orthographies, does not include symbols for morpheme boundaries.

The economy principle, regardless of how 'deeply' it is applied, suggests that an optimal orthography is not characterized by unnecessary variation in the shapes of the morphemes. Therefore it is considered advantageous if a morpheme has the same shape everywhere. There are ways that this positive feature can be maintained without using the same symbol for two different sounds (as t for /t/ and /s/, in *rate* : *ratio* above). The use of diacritic "symbols" and (true) diacritics are two such ways. Consider the following infamous pairs of words:

divine	/dɪvayn/	divinity	/dɪvɪnɪti:/
serene	/səriyn/	serenity	/sərɛnɪti:/
profane	/profeyn/	profanity	/profænɪti:/

The 'long' i, e, and a, which are phonetically the diphthongs /ay/, /iy/, and /ey/ of the isolated form (first and second columns), are indicated in the English orthography by the silent e that occurs at the end of the word (functioning as a diacritic symbol). These vowels occur "short" (phonetically lax) in other forms, such as in the third and fourth columns, but the roots have nearly the same shape as in the isolated forms. In this way English follows the economy principle quite well. Compare this approach with one which would represent the morphemes very differently. If each phoneme had a separate representation, English might look something like the phonemic representations shown above.

It is not hard to find examples of how a language does not follow the various principles discussed above. English and French are often cited as having terrible spelling systems, and yet in some ways they are very good. The Greek orthography was not an optimal one in various respects. Certain consonant clusters, which cannot be analyzed as single consonants, were written with special symbols: /ps/ as ψ and /ks/ as ξ. Because of this, many morphemes had alternating shapes unnecessarily. For example, if the future suffix {-s} was added to the root {pemp-} 'send', the result was written as πψ rather than πσ. This violates the economy principle since a morpheme is written with more than one shape unnecessarily. The phoneme /h/ occurred only word-initially and was represented by a special mark above the vowel, as in the word [hepta] 'seven'. While this is a good idea, since these words pattern in certain ways like vowel-initial words, the orthography also indicates by means of another special mark when the

word does *not* begin with an /h/, as in the word [epi] 'on'. Finally, Greek also violated the economy principle by having two shapes for lower case /s/: one shape (σ) was used word-internally, and the other (ς) was used word-finally.

Comparison

You have likely already come to the conclusion that an orthography which is strictly phoneme-based or strictly morpheme-based is less than ideal. Clearly there is reason to question either of these extreme positions. It is generally agreed that at the initial stages of reading and writing, less effort is required to learn an orthography that is phoneme-based. (This is an important point to remember if schooling to teach reading and writing is scarce or not available.) Nevertheless, it is also claimed to be true that a morpheme-based orthography allows for a greater facility in reading at later stages. After the initial stages the reader ceases to "sound out" words and instead makes a form-to-meaning connection. Compare the following representations of telegraph/telegraphy.[2]

Phoneme-based	Morpheme-based
telʌgraf	telegraf
tʌlegrʌfii	telegrafi

Whereas the phoneme-based representation may be easier for new readers, it presents some real disadvantages for more skilled readers since it forces them to recognize every significant phonological alternation, no matter how regular.[3]

We should also point out that a phoneme-based orthography for English would be difficult to implement in view of the radically differing dialects of English. The currently used orthography does not distinguish between dialects, whereas a phoneme-based one would of necessity have to reflect one certain dialect in the spelling of each word.

Psycholinguistic factors

The previous section outlined some facts that need to be considered when developing an orthography. Those facts were primarily based on the linguistic description of the language. It was shown that a careful morphophonemic analysis is a prerequisite since creating an orthography involves more than the choice of symbols for the contrasting sounds. For this reason, the mat-

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[2] The double *i* at the end of 'telegraphy' in the first column is to distinguish this vowel from the lax *i* which could be written *ɪ*.

[3] There are two phonological rules suppressed in the morpheme-based representation above. One is the rule which tenses final vowels. The other is the rule which reduces unstressed vowels in certain positions, often to schwa (which we take here as the unstressed allophone of the phoneme /ʌ/ in English--a common view under certain assumptions, but not a necessary one).

ter of creating an orthography is something which cannot simply be tossed into the hands of a novice, whether a native speaker of the language or not. In this section we will briefly consider some psycholinguistic factors that are involved in creating an orthography.

One important consideration is the attitude of native speakers to the written form of their language, especially if there exists any indeterminacy in the linguistic analysis. A speaker's knowledge of his language may provide valuable input to the orthography creation process by helping to answer certain questions, whether directly or indirectly. Should a word break be put here? How should this be written? Therefore, while there is no substitute for a careful phonological analysis of the language, speaker reaction to proposed spellings needs to be carefully considered. (Nevertheless, great caution must be exercised in this area since many extraneous factors could be affecting the speaker's answer, such as a desire not to make the language look at all different from the national language.)

Another factor to consider is the importance of a particular phonological feature in the language. This is especially relevant where stress or tone has only a marginal contrastive function. Consider English, for example, where stress placement contrasts such noun/verb pairs as cóntrast/contrást and pérmit/permít. Despite this contrastive function of stress in English, stress is not represented in the orthography. Likewise in Seri, although stress is not completely predictable, it is not represented in the orthography. (An alternative would be to represent stress only where it is not predicted, as in Spanish.)

The decision to use a particular orthographic symbol rather than another also involves consideration of various facts, including distinguishability. The phoneme /ð/ in English is represented by the sequence *th* rather than an entirely different symbol. (This is only possible because the phonemes /t/ and /h/ rarely occur together, and then only in compounds, e.g. *outhouse*.) An alternative representation such as a *d* with a bar through it would probably be judged less acceptable since it is visually so much like the standard *d*. For similar reasons, the phoneme /ɨ/ in some languages is represented as *ü* (umlaut *u*) rather than *ɨ* (barred *i*), since *ï* (umlaut *i*) is easily confused with *i*, since it is distinguished from it only by a single dot.

One should not assume that an alphabetic symbol must be based on some phonetic chart. Consider the following ways in which the phonemes /š/ and /ñ/ are represented in the following languages:

	š		ñ
English	*sh*	Portuguese	*nh*
French	*ch*	Italian	*gn*
Seri	*z*	Spanish	*ñ*

Sociolinguistic factors

Orthographies are not designed for linguists but for the speakers of the language--speakers who live in social groups and who invariably have differences in speech habits. An orthography that is designed to be acceptable over a wide dialectal area will be different from one that is designed for a narrow linguistic group. The broader the linguistic group, the less likely it is that a phoneme-based orthography will be utilizable. The advantages of an orthography that is more morpheme-based (such as permitting greater cross-communication) must be weighed, however, against the disadvantage that more instruction in the orthographic system will probably be required.

It is likely that speakers of a minority language will also read and write a majority or national language. It is therefore usually considered advantageous if the symbol-phoneme correspondences in the two languages are as much in agreement as possible. This will help a person who is literate in one language to more easily become literate in the other. Close conformity may actually be required by the government of the country. (While often the minority group wants their written language to look like other languages held in esteem, it is also true that sometimes the minority group want their language to look *different* from the national language and will choose certain symbols as a sign of the difference.) Such conformity is not without disadvantages, however. As the result of orthographic conventions in Spanish, the Seri prefix {k-} is spelled *c-* before back vowels and *qu-* before front vowels. This is a complication for Seri readers, but by learning it for Seri, they also learn it for Spanish, and vice versa.

Practical factors

Some factors bearing on the creation of an orthography are related to such matters as what is available on printing presses and typewriters in the country. There is no reason to introduce a phonetic symbol into the orthography--the phonemes /æ/, /š/, and /X/ are represented as *e*, *z*, and *x* in Seri, for example, because the latter symbols are easier to teach and reproduce than the former.

Other Matters

Orthography design is more than just a matter of choosing symbols. A rather knotty problem in many cases is where to make word breaks. Some morphemes, such as prepositions or postpositions, may be unstressed because they are not nouns or verbs, and therefore do not appear in isolation (see chapter 12). In some languages, these are written as separate words, and in others they are written as if they were prefixes or suffixes. While some people (linguists and native readers) prefer to follow the principle 'when in doubt, string it out' (write morphemes as separate words), this apparently does not always work.

Another problem that cannot be ignored has to do with small (or great) dialect differences. How should words be spelled when people say them differently. English orthography is vague enough that differences between the pronunciation of *roof*, *route*, and *creek*, for example, are simply ignored. Sometimes, a spelling system fares better if it is slightly more abstract, if it 'peels off' certain phonological rules. For example, Seri has a rule that changes a *p* to *kʷ* (the latter is written *cö* in Seri) when it immediately follows a *kʷ*. So when the prefix *kʷ-* is added to a word such as *poofp* 'if s/he arrives', the result is [kʷ:o:ɸp], for most speakers. Nevertheless, some speakers (we have recently learned) actually pronounce the word as [kʷpo:ɸp]. In other words, some speaker assimilate the *p*, and some do not. The orthography of Seri has ignored this rule and lets people pronounce the sequence as they wish. The word 'if s/he arrives to him/her/it' is spelled *cöpoofp*, and adequately serves both 'dialects'. Such solutions do not always work, but they are worth considering.